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Understanding Inflation Drivers: Differentiating Common and Idiosyncratic Dynamics in Malaysia

Jessie Cheok and Zul-Fadzli Abu Bakar[1]

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Abstract

To manage inflationary pressures effectively, central banks need to be able to differentiate between economy-wide (common) and idiosyncratic drivers of inflation, and accurately estimate these drivers for an effective monetary policy formulation. To achieve this objective, this paper estimates common inflation for Malaysia using a monthly dynamic factor model from Doz et al. (2012) with the disaggregated Consumer Price Index (CPI) series at the five-digit level. We find that common inflation serves as a gauge of underlying inflationary pressures that is less susceptible to idiosyncratic shocks, more persistent, and can signal the future trajectory of headline inflation. Unlike earlier inflationary episodes, the recent surge in inflation post-COVID-19 pandemic reflects economy-wide rather than sector-specific factors, underscoring the need for pre-emptive adjustments in monetary policy. The estimated common inflation could serve as a valuable complement to existing underlying inflation indicators, including exclusion-based, trimmed mean, weighted-median, and double-weighted inflation, enriching the comprehensiveness of analyses on inflation dynamics.

JEL classification: C1, C55, E31, E52, E58

Keywords: Underlying inflation, Dynamic factor model, Monetary policy

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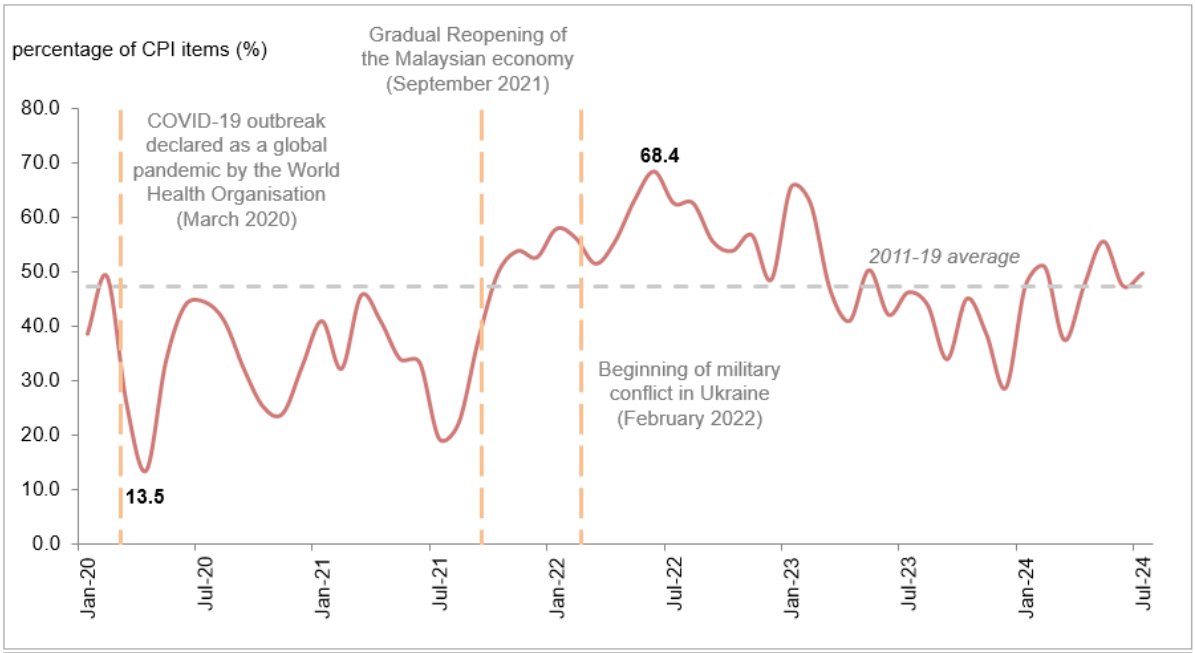
1. Introduction

A widespread and persistent increase in consumer prices characterised the 2022 inflationary episode in Malaysia. As the Malaysian economy reopened following the COVID-19 pandemic, the average share of CPI items experiencing monthly price increases surged to 68.4% in June 2022 compared to 13.5% in April 2020 during the outbreak of the COVID-19 pandemic (Chart 1). This broad-based price growth was accompanied by a notable persistence of inflationary pressures, as evidenced by the prolonged period of consecutive above-average[2] price increases (Chart 2).

Several factors contributed to these sustained price increases, including global supply chain disruptions, pent-up demand, adverse weather conditions, geopolitical tensions, and sustained strength of the US dollar against the ringgit (Bank Negara Malaysia, 2023). The inflationary impact was particularly evident in the food and non-alcoholic beverages category, significantly increasing the overall CPI headline inflation.

Notwithstanding these challenges, a shift towards disinflationary forces began in 2023, gradually easing price pressures. By early 2024, inflation had stabilised.

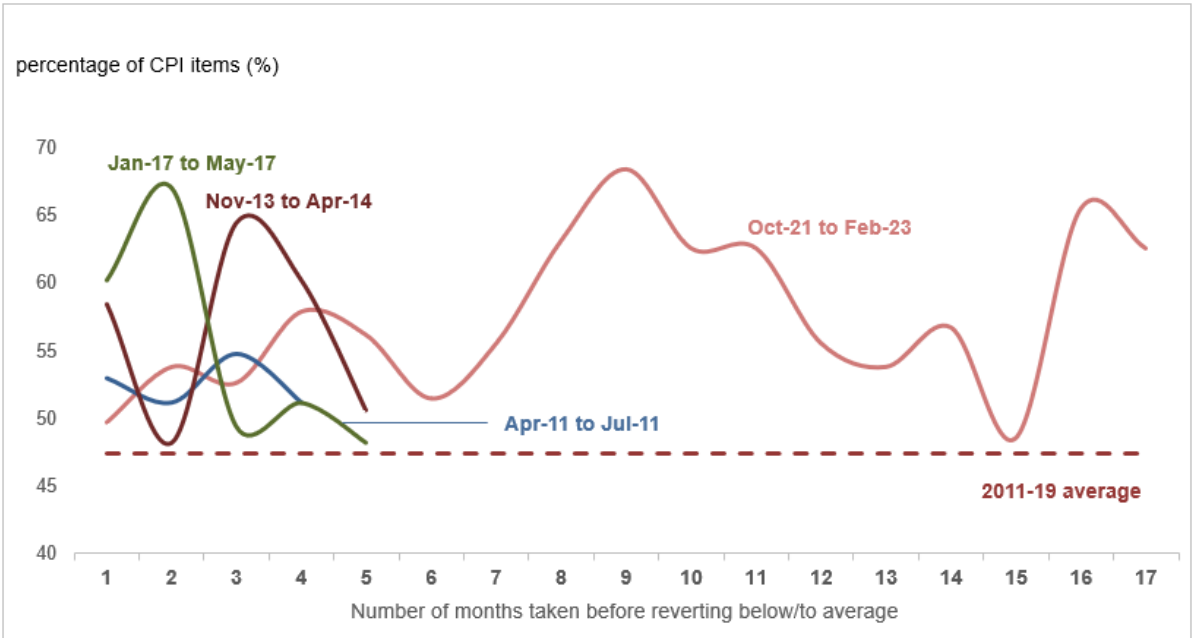
Chart 1: Average share of CPI items recording month-on-month price increase



Note: This is calculated based on the month-on-month inflation for disaggregated CPI items at the five-digit levels.
Source: Department of Statistics, Malaysia and authors' estimates.

[2] The average share of CPI items recording month-on-month price increases is 47.4% of CPI items, which is calculated based on monthly frequency from January 2011 to December 2019.

Chart 2: Episodes of consecutive above-average share of CPI items recording month-on-month price increases



Note: This is calculated based on the month-on-month inflation for disaggregated CPI items at the five-digit levels.
Source: Department of Statistics, Malaysia and authors' estimates.

One key concern for monetary policymakers during this period was whether the inflationary trend would be persistent or short-lived. To better understand inflation dynamics, policymakers would need to distinguish between persistent inflationary pressures and short-term idiosyncratic shocks. This distinction is crucial, as monetary policy operates with significant and variable lags, making it ineffective in addressing short-term supply shocks or affecting temporary price deviations. Instead, monetary policy focuses on managing broad-based inflationary pressures that affect price stability over the medium term.

To better gauge underlying inflation trends and avoid reacting to temporary price movements that typically affect only a small subset of items, the common approach is to focus on the "core" inflation measure, which is computed by excluding price-volatile and price-administered items. However, core inflation remains susceptible to temporary shocks in sectors beyond these excluded categories, which may limit its effectiveness as a reliable indicator of underlying inflationary pressures. For instance, temporary adverse weather disruptions and short-term fluctuations in cost factors could still affect core inflation.

Given the limitation of core inflation, this paper introduces an alternative underlying inflation measure in Malaysia, termed "common" inflation, constructed through a dynamic factor model (DFM) framework. By leveraging the DFM, we can distinguish between broad inflationary pressures (common inflation), which reflect economy-wide changes, and sector-specific price movements (the idiosyncratic component). Common inflation tends to be more persistent,

offering a gauge of underlying inflationary pressures and signalling the future trajectory of headline inflation. In contrast, the idiosyncratic component is generally more transient. This new estimate of common inflation complements existing underlying inflation indicators monitored by Bank Negara Malaysia, including exclusion-based, trimmed mean, weighted-median, and double-weighted inflation (Bank Negara Malaysia, 2024), enhancing the comprehensiveness of inflation dynamics analyses. When examining past inflationary periods using this metric, we observe that the inflationary episode in 2022 was characterised by a distinctive dynamic, primarily driven by the significant contribution of common inflation to headline inflation. This shift reinforces the role of monetary policy to rein in broad-based inflationary pressures that could risk price stability over the medium term.

This study contributes to the growing literature on identifying underlying inflation, particularly in the context of the post-pandemic economic recovery. Previous studies, such as Luciani (2020), Bańbura and Bobeica (2020), Khan et al. (2013), and Amstad et al. (2014), have utilised large-dimensional factor models to analyse disaggregated prices in advanced economies. Using a similar approach, recent studies, including Potjagailo et al. (2022), Scally and Walsh (2022), and Nir et al. (2021), have highlighted the pandemic's role in amplifying inflationary pressures in advanced economies. This study extends these findings by focusing on the impact of the COVID-19 pandemic on inflationary pressures in Malaysia. Building upon the work of Ramlee and Abdul Rani (2016) and Chuah and Abu Bakar (2017), which focused on developing underlying inflation measures in Malaysia, our study leverages the most recent, granular five-digit data[3] from the Department of Statistics Malaysia (DOSM) since January 2024. Additionally, we employ a dynamic factor model (DFM) to construct an underlying inflation measure, aiming to more effectively identify the underlying inflationary pressures by capturing the dynamic relationships between prices.

The remainder of this paper is organised as follows. Section 2 describes the data and methodology used. Section 3 presents our analysis of common inflation. Section 4 demonstrates the practical application of common inflation. Section 5 addresses the robustness of our findings. Finally, Section 6 concludes the paper.

2. Data and Methodology

To quantitatively assess common inflation, we apply a Dynamic Factor Model (DFM), which estimates a common component across a wide range of disaggregated inflation price series. The DFM leverages lag dynamics to capture the evolving relationships among these series

[3] To differentiate the level of detail in categorising consumer goods and services, statistical authorities use a 'number'-digit classification system. A higher number indicates a more granular classification, allowing for a more detailed analysis of price changes within specific product or service groups.

over time, efficiently condensing shared trends into a small set of latent factors. This approach enables a robust representation of common inflation trends within a diverse set of observed time series. To compute common inflation, the input comprises disaggregated CPI series at the five-digit level sourced from the DOSM. This dataset spans from January 2010 to July 2024 and is recorded monthly. Firstly, each series is adjusted to eliminate the direct influence of changes in tax policies (GST and SST) in April 2015 and September 2018. This adjustment was made by removing the additional month-on-month impact resulting from the implementation of tax policies compared to the average for the corresponding month from 2010 to 2014. Removing the transitory impact of policy-driven price changes, such as those caused by tax reforms and one-off adjustments from broader supply-side policies, is a standard practice in inflation analysis to ensure that temporary distortions do not obscure underlying inflationary trends.[4] Next, following the conventional practice in the factor model literature, the inflation rates for each disaggregated CPI series are standardised so that they have zero mean and unit variance. Using the DFM, each series is decomposed into a common component, representing a shared trend with other individual CPI items, and an idiosyncratic component that captures fluctuations specific to those items.

A standard baseline DFM[5] for disaggregated CPI series *i* at time *t* can be expressed as follows:

$$y_{it} = X_t \beta + \varepsilon_{it} \text{, where } \varepsilon_t \sim N(0, \sum) \ \ i.i.d \quad (1)$$

$$X_t = \sum_{j=1}^{p} A_j X_{t-j} + n_t \text{, where } n_t \sim N(0, Q) \ \ i.i.d \quad (2)$$

Equation (1) represents the measurement or observation equation, while equation (2) is known as the transition or state equation, governing the evolution of the common factors X_t according to a vector autoregressive of lag *p* (VAR(*p*)) process. These equations do not include trend or intercept terms, as the data y_t is stationary and standardised (scaled and centred) before estimation. The system matrices are defined as follows, where y_t denotes a *n* x 1 vector of observed CPI series at time *t,* where *n* is the number of observed CPI series*,* X_t represents a *r x 1* vector of common factors at time *t,* where *r* is the number of common factors*,* β signifies the *n x r* measurement (observation) matrix, A_j stands for the *r x r* state transition matrix at lag *j,* Q represents the *r x r* state covariance matrix*,* $\sum$ denotes the *n x n* measurement

[4] This approach is consistent with best practices recommended in the inflation literature, which emphasise excluding transitory effects to enhance the reliability of underlying inflation measures (e.g., Wynne, 1999). Such practices are commonly employed internationally, ensuring comparability and alignment with global standards.

[5] To implement the DFM, this paper used the 'dfms' package (version 0.2.1) in R with Kalman Filtering and Smoothing until EM convergence following Doz et al. (2012).

(observation) covariance matrix, which is assumed to be diagonal, indicating that all covariation between the series is explained by the common factors.

When determining the optimal number of factors, we prioritize the first common factor. This choice is grounded in the principle that, ideally, all CPI items should share a single underlying component. This perspective is consistent with the factor selection method proposed by Hallin and Liška (2007), which, in this specific case, suggests a one-factor model. Furthermore, the choice of three lags is established through the Schwarz Criterion (SC) in the transition equation (2). Additionally, no factor lags are incorporated in the observation equation for the common component.

Subsequently, the resulting common component is scaled to headline inflation, yielding a measure of common inflation. Following Statistics Canada (2021), the common factor is scaled to headline inflation using linear regression. In this analysis, the year-on-year percentage change in headline inflation, excluding the direct impact of changes in tax policies (GST and SST) (ex-tax), serves as the dependent variable, while the common factor acts as the independent variable. This ensures that the common inflation is expressed in inflation units, as the common factor obtained from the preceding step has a zero mean and unit variance. The resulting common inflation is obtained using the fitted values from the following regression, estimated using January 2011 to July 2024 data:

$$Headline\ inflation_t = \alpha + \lambda\ X_t + \epsilon_t \qquad (3)$$

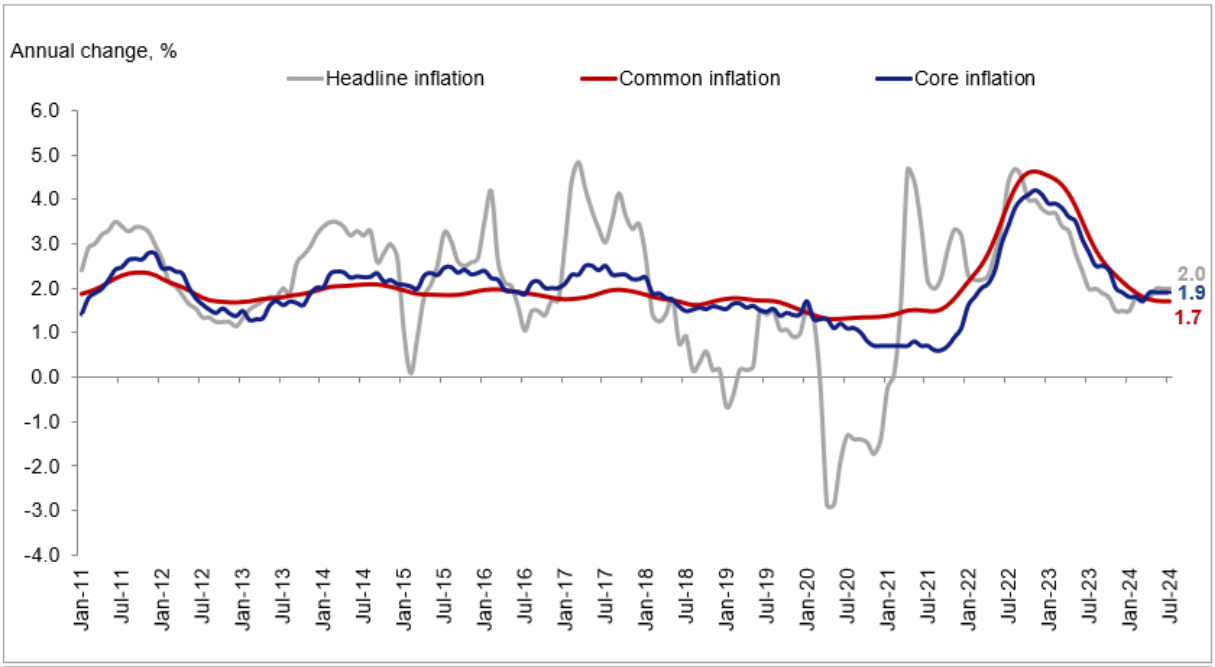
where α is the mean of ex-tax headline inflation over the estimation period, λ reflects the sensitivity of ex-tax headline inflation to the common factor from equation (2), and ϵ_t refers to the error term. The residual of headline inflation not explained by the common component is referred to as the idiosyncratic component.

3. Evaluation of Common Inflation Measure

Chart 3 illustrates the trajectories of common inflation, exclusion-based core inflation (referred to hereafter as core inflation), and headline inflation. Generally, common and core inflation follow similar paths, but short-term divergences occurred before the COVID-19 outbreak in 2020. Common inflation tends to be more stable, while exclusion-based core inflation exhibits greater fluctuations, partly reflecting temporary movements of cost factors. This highlights that while core inflation excludes volatile and administered price items, it remains vulnerable to sector-specific fluctuations. In contrast, common inflation captures the overall trend across the CPI basket and is generally less susceptible to idiosyncratic price movements. Meanwhile, headline inflation has shown significant volatility, primarily driven by fluctuations in global oil prices.

In the subsequent subsection, we will compare their statistical properties, including relative volatility, persistence, and predictive power for long-term trends in headline inflation, to evaluate the efficacy of common and core inflation measures as indicators of underlying inflation.

Chart 3: Headline, core, common inflation measures



Source: Department of Statistics, Malaysia and authors' estimates.

3.1 Framework for Evaluating Statistical Characteristics

In principle, headline inflation (π_t) can be decomposed into two components: underlying inflation (intended to capture the underlying trend, π_t^U) and a residual (representing the transitory noise, e_t):

$$\pi_t = \pi_t^U + e_t \qquad (4)$$

Underlying inflation represents the long-term price trend, excluding transitory fluctuations. This aligns with the long-term view of the vertical Phillips curve, where monetary policy primarily influences the general price level. To this end, identifying underlying inflation, characterised by lower volatility, greater persistence, and predictive power for long-term headline inflation trends, is crucial for effective monetary policy implementation.

3.2 Track Persistent Inflation: Volatility and Persistence

Underlying inflation measures are characterised by being less volatile and more persistent than headline inflation due to their emphasis on capturing long-term underlying trends.

Table 1 presents volatility and persistence measures for headline, core, and common inflation. Volatility is calculated as standard deviation. To assess inflation persistence, we employ the empirical strategy outlined by Michelis et al. (2024) as follows:

$$\pi_t = \alpha + \gamma_1 \pi_{t-1} + \gamma_2 \pi_{t-2} + \omega x_t + \beta s_t + \delta \mu_t + \varepsilon_t \quad (5)$$

where π_t is the inflation measure in quarter *t*, x_t is the output gap, μ_t is (lags of) global oil price inflation, s_t is an index measuring global supply chain disruptions, and ε_t is an uncorrelated error term.[6] We measure inflation persistence by summing the coefficients of the lagged inflation terms in this regression.

In terms of volatility, headline inflation is the most volatile measure, while core and common inflation exhibit lower volatility. Regarding persistence, common inflation demonstrates slightly higher persistence than core inflation. This is likely due to its construction, which filters out idiosyncratic shocks and focuses on underlying inflationary trends. Notably, the residuals of core and common inflation exhibit the least persistence, and the greatest volatility compared to all other inflation measures.

Table 1: Volatility and persistence of inflation measures

	Volatility		Persistence	
	π_t^U	e_t	π_t^U	e_t
Headline inflation	1.49	-	0.68	-
Core inflation	0.74	1.22	0.81	0.57
Common inflation	0.72	1.30	0.86	0.61

Note:
1/ Sample period: 2011 January – 2024 July.
2/ π_t^U represents the underlying inflation as defined in equation (4), whereas e_t signifies the residual component, also as specified in equation (4).
Source: Department of Statistics, Malaysia and authors' estimates.

3.3 Convergence of Headline Inflation Towards Underlying Inflation Measures

One of the key objectives of developing underlying inflation measures is to predict the future behaviour of headline inflation. We follow Cogley (2002) and others in evaluating the within-

[6] The output gap is obtained from Bank Negara Malaysia, derived using an average of several methodologies, including the Production Function, Laubach-Williams model, Kalman Filter, and DSGE model (Bank Negara Malaysia, 2024). Global oil price is sourced from Bloomberg, while the Global Supply Chain Pressure Index (GSCPI) is obtained from the Federal Reserve Bank of New York.

sample forecast performance of these measures using the following regression for monthly horizon *h*:

$$\pi_{t+h} - \pi_t = \alpha_h + \beta_h (\pi_t - \pi_t^U) + \varepsilon_{t+h} \quad (5)$$

where π_t and π_t^U denote headline inflation and the relevant underlying inflation measures, respectively. The term $(\pi_t - \pi_t^U)$ represents the transitory component of monthly headline inflation that is expected to dissipate over time.

An ideal measure of underlying inflation should be unbiased ($\alpha_h = 0$) and have a strong predictive relationship with future inflation, ideally capturing substantial variation with a coefficient β_h close to -1. If headline inflation tends to revert towards underlying inflation, we would expect a negative β_h coefficient on the gap between headline and underlying inflation.

As shown in Table 2, using data from January 2011 to July 2024, we find a lack of evidence to reject the joint hypothesis ($\alpha_h = 0$, $\beta_h = -1$) at the 5% significance level, indicating that headline inflation fully reverts to the underlying inflation measure within one year.[7] This result underscores the utility of underlying inflation dynamics as a reliable predictor of headline inflation, absent transitory shocks. More importantly, these findings suggest that focusing on underlying inflation measures, rather than headline inflation, is crucial for assessing long-term price stability. This approach becomes especially relevant given that frequent transitory shocks, such as supply-side disruptions and external price fluctuations, have historically influenced headline inflation in Malaysia. By emphasising underlying inflation, monetary policy can better target sustainable price stability, providing a clearer path for setting appropriate policy responses, rather than reacting to short-term volatility.

Table 2: Convergence of headline inflation towards underlying inflation measures

	α_h	β_h	*p-value: Joint hypothesis of ($\alpha_h = 0$, $\beta_h = -1$)*
Core inflation	-0.15	-0.98	0.56
Common inflation	-0.23	-1.02	0.22

Note: Sample period: 2011 January – 2024 July.
Source: Department of Statistics, Malaysia and authors' estimates.

[7] To establish a unidirectional convergence between headline inflation and underlying inflation measures, we conducted a comprehensive analysis. Our findings (not shown) provide no evidence to support the reverse relationship, suggesting that underlying inflation measures (core and common inflation) do not converge to headline inflation.

4. Application of Common Inflation Measure

In this section, we present the practical use of common inflation measure to analyse inflation dynamics. We begin by examining the common dynamics in headline inflation and its key categories. By identifying which categories are more sensitive to these common dynamics, we can better understand the underlying inflation trends.

Next, we decompose headline inflation into common inflation and idiosyncratic components. This analysis provides a clearer picture of whether headline inflation dynamics are primarily influenced by persistent general price pressures (as indicated by the common inflation) or by short-term idiosyncratic price shocks.

4.1 Common Dynamics in Headline Inflation

To assess the extent to which generalised price pressures are driving headline inflation, Table 3 presents the share of variance in headline inflation and its subcomponents explained by the movement of the common component, X_t, as indicated in equation (2). This measure is derived using the square of the Pearson product-moment correlation coefficient between the inflation components and the common component, following the methodology of Khan et al. (2014). The results show that the common component explains a modest 24.6% of the variability in headline inflation, suggesting that most fluctuations are driven by idiosyncratic shocks.

Among the subcomponents, core inflation exhibits the largest share of variance explained by the common component. This aligns with the previously noted similarity in the trajectories of core and common inflation. Among the core basket items, staple food products such as bread and bakery products, macaroni, noodles and pasta, breakfast cereals, food away from home, and ready-made food are most significantly influenced by the common factor. Some non-food items, such as maintenance & repair of personal transport equipment also being affected by the common dynamics to a lesser extent.

Conversely, fuel, other administered prices, and price-volatile items are less sensitive to the common dynamics, with fuel showing the least sensitivity to the common component. This indicates that idiosyncratic factors largely drive fluctuations in these categories and tend to have a transitory impact on headline inflation.

Table 3: Common dynamics in disaggregated CPI inflation

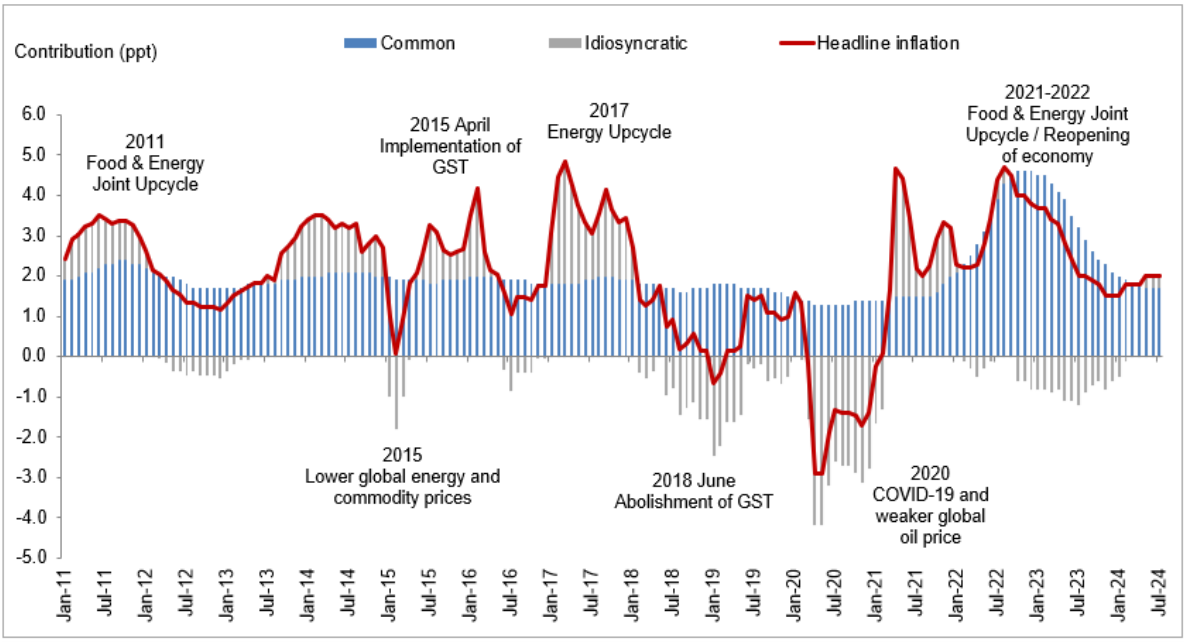
Items	CPI 2024 weight (%)	Share of variance explained by common component (%)
Headline inflation	100.0	24.6
Core inflation	76.7	74.7
Price administered (excluding fuel)	10.9	5.7
Price volatile	7.2	10.0
Fuel	5.7	0.3
Disaggregated core item: Top 5 share of variance explained by common component		
Bread & bakery products	0.9	88.5
Macaroni, noodles & pasta products	0.4	86.4
Breakfast cereals	0.1	84.0
Food away from home	13.4	82.7
Ready-made food	0.1	79.6

Note: Sample period: 2011 January – 2024 July.
Source: Department of Statistics, Malaysia and authors' estimates.

4.2 Decomposition of Headline Inflation

Chart 4 illustrates the decomposition of monthly headline inflation into its common inflation (fitted values from equation (3)) and idiosyncratic (residual from equation (3)) components. The blue bar represents common inflation, signifying the portion of headline inflation attributable to general inflationary pressures, while the grey bar denotes the idiosyncratic element. These two components, by construction, combine to form the total headline inflation, which is depicted by the red line on the plot.

Chart 4: Decomposition of headline inflation by common and idiosyncratic components



Note: Upcycle refers to periods when global food and/or energy commodities exhibited year-on-year movements higher than the standard deviation. Global food and energy commodities data are from World Bank Commodity Price Data (The Pink Sheet).
Source: Department of Statistics, Malaysia and authors' estimates.

By filtering out the influence of idiosyncratic shocks, common inflation provides a stable signal of underlying inflation, representing a significant portion of headline inflation.[8] While typically stable, noticeable increases in common inflation coincided with periods of strong economic growth and heightened cost pressures, as seen in 2011 and 2022, when real GDP growth reached 5.3% and 8.7%, respectively (2011-2019 average: 5.1%). During these periods, significant cost pressures arose from the upswing in global commodity prices (2011: 24.6%; 2022: 29.7%; 2011-2019: -1.0%) and the ringgit depreciation in 2022. This reflects the close relationship between common inflation and economy-wide factors, including aggregate supply and demand conditions.

[8] Similar findings have been observed in other countries, including the UK, as Potjagailo et al. (2022) noted.

Most fluctuations in headline inflation were driven by idiosyncratic shocks, reflecting short-term global cost fluctuations. These fluctuations often lead to price adjustments unique to specific sectors. As highlighted earlier, the fuel category exhibits the least sensitivity to common dynamics, with its movements largely driven by idiosyncratic factors. This aligns with the decomposition of headline inflation, where the majority of fluctuations occurred during energy price shocks. Between 2016 and 2020, common inflation gradually declined, but headline inflation remained volatile due to idiosyncratic movements.

Headline inflation surged following the COVID-19 recovery, driven by a rise in common inflation. Initially, global cost factors affected specific domestic consumer prices, such as flour and cereal grains, which saw a month-on-month increase of 2.8% in the second quarter of 2022, compared to the 2011-2019 average of 0%. Similarly, cereal-based products rose by 1.1%, versus the 0.1% average. This was exacerbated by the 2022 Ukraine conflict, which pushed global energy and commodity prices to historical highs, spilling over into a broader range of consumer prices. At the same time, domestic demand rebounded as the economy reopened, with real private consumption growing 11.2% in 2022 compared to the pre-pandemic average of 7.1%, and online retail trade growth reaching 19.8% versus 13.8% in 2019. Bank Negara Malaysia's industrial engagements in May 2023 indicated a potential shift in firms' price-setting behaviour in response to high inflation and strong demand. This change allowed larger firms, in particular, to adjust prices more easily, further contributing to the rise in common inflation.

In essence, the sharp rise in common inflation since 2022 was fuelled by a combination of demand and supply factors. Unlike the short-term idiosyncratic component, which reflects sector-specific price changes, common inflation captures broad-based price pressures driven by economy-wide shocks that are more persistent and can serve as a key indicator of the future path of headline inflation. In response, pre-emptive adjustments in monetary policy became necessary, given the significant and variable lags in its effects. Timely interventions were crucial in managing widespread inflationary pressures and safeguarding medium-term price stability. Consequently, Bank Negara Malaysia raised the Overnight Policy Rate (OPR) by 125 basis points—from 1.75% to 3.00%—since the economy reopened following the COVID-19 outbreak, ensuring that medium-term price stability remains conducive to sustainable economic growth. Since then, these policy actions have been followed by stabilising inflation, with common inflation gradually normalising to its long-term trend in line with the steady macroeconomic conditions.

5. Sensitivity Analysis

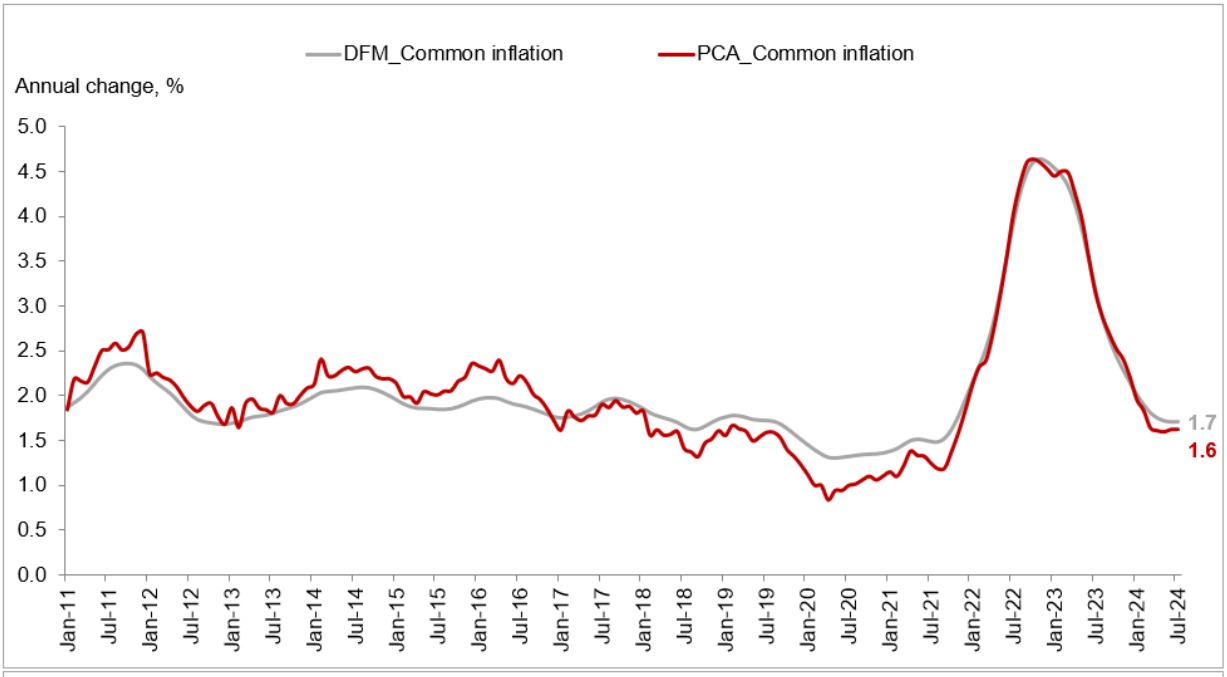
This section investigates the robustness of the extracted common component across various assumptions concerning model specification and estimation, the utilised data within the model, and the distinction between real-time and full-sample estimation.

5.1 Static versus Dynamic Factor Model

While principal component analysis (PCA) is a popular method for identifying co-movements in large datasets, dynamic factor models (DFM) offer several advantages. Stock and Watson (2002) note that PCA can effectively capture the factor space, but only when a sufficient number of principal components are used. DFM, however, is particularly valuable for analysing evolving economic conditions due to its ability to capture time-varying relationships among variables (Stock and Watson, 1998).

To assess the performance of these two methods, we compared common inflation derived from both PCA and DFM using a single principal component and a similar dataset. As shown in Chart 5, PCA produced more volatile common inflation estimates, especially before 2022, compared to DFM. This lower volatility in DFM estimates may reflect its ability to capture time-varying dynamics, which could also contribute to less fluctuation across different time horizons.

Chart 5: Common inflation derived from dynamic factor model and principal component analysis



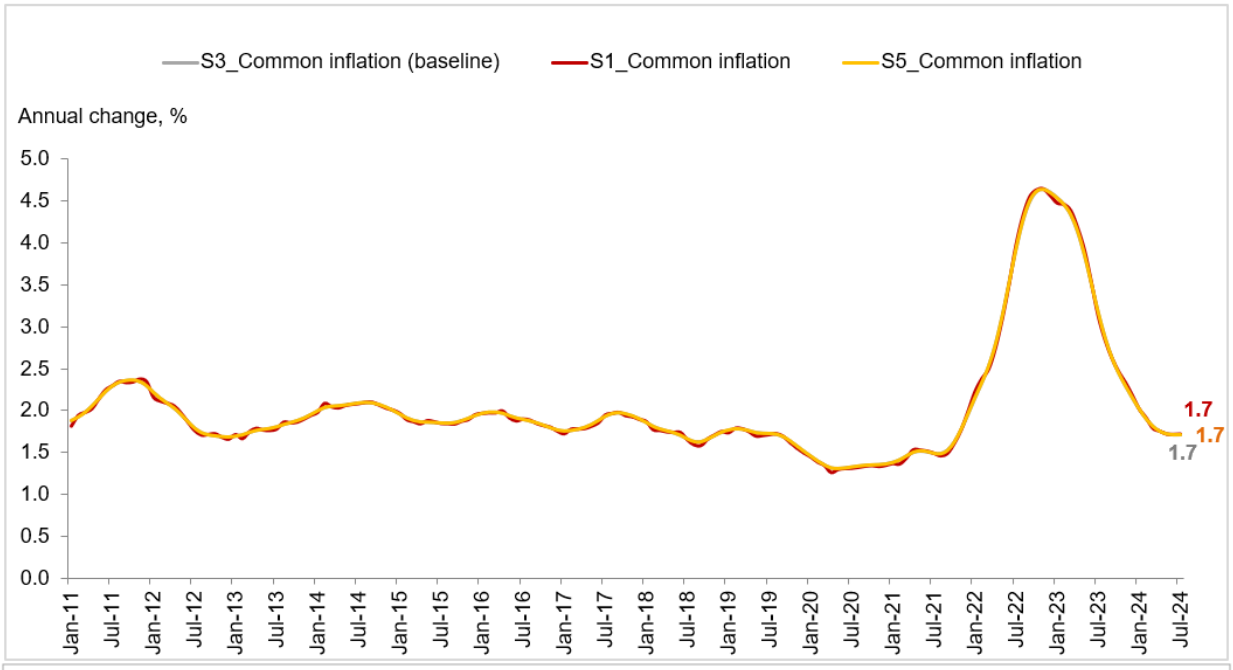
Source: Department of Statistics, Malaysia and authors' estimates.

5.2 Alternative Lag Specifications

To assess the sensitivity of the DFM, it is essential to investigate the impact of different lag lengths. A benchmark number of lags (s = 3) was selected based on information criteria. However, to evaluate the robustness of the model, two alternative scenarios with different numbers of lags (s = 1, 5) are tested against the benchmark. This sensitivity analysis allows for a comprehensive examination of the model's robustness, ensuring that the conclusions and inferences remain valid and reliable under varying lag structures.

Chart 6 presents the monthly common inflation estimated using lag specifications of s = 1, 3 (the benchmark), and 5. Measures based on these alternative lags in the DFM closely align with the benchmark model's use of 3 lags. In summary, no significant disparities were detected when employing varying lag specifications.

Chart 6: Comparison of alternative lag specifications against baseline



Source: Department of Statistics, Malaysia and authors' estimates.

5.3 Real-time reliability

Similar to other model-based unobserved latent variables such as the output gap or the non-accelerating inflation rate of unemployment, common inflation is subject to revisions when new observations are added to the dataset. Within the DFM framework, the inclusion of new observations into the dataset leads to different estimations of the common components. The resulting measure of common inflation, obtained through scaling to headline inflation via linear regression, is similarly subject to revision.

For the real-time estimates, the process begins by extracting the common component from a 5-year dataset starting in 2015. Subsequently, the sample size is incremented every three months, and the common component is both extracted and scaled during these intervals. This iterative process extends until July 2024, culminating in the acquisition of the complete common inflation shown in Section 3. The outcome of this procedure results in a collection of 34 time series as visualised as a range in Chart 7.

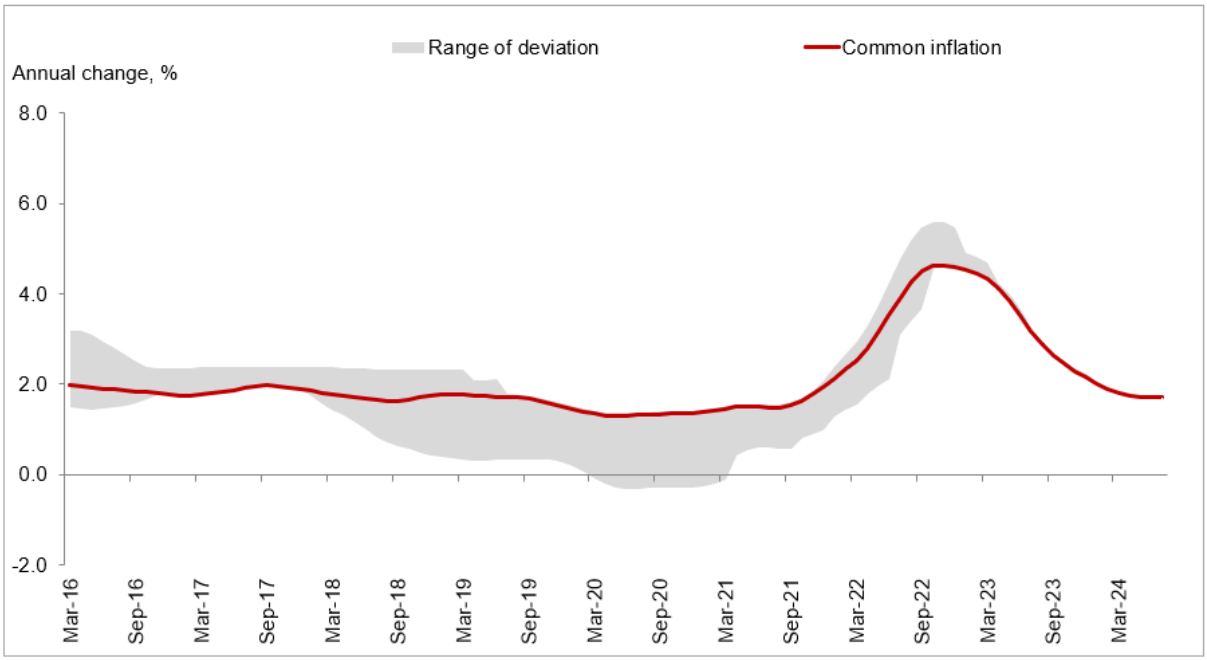
On average, historical revisions to common inflation were approximately 0.5 percentage points, mainly reflecting the impact of the relatively small sample size. This aligns with the findings of Khan et al. (2013), who noted similar initial revisions during the first 10 years of common component extraction of about 0.4 percentage points. The sensitivity of smaller samples to additional data points, particularly in terms of mean and variance of inflation, contributes to these revisions. As the sample size increases, the extent of revisions tends to diminish, approaching approximately 0.1 percentage points, and becoming negligible after around 10 years.

The COVID-19 pandemic, especially between March 2020 and December 2021, introduced significant shocks that likely influenced real-time estimate revisions due to an extensive period of unchanged price movements. During this period, 46.1% of CPI items showed no monthly price changes, compared to 29.5% pre-pandemic. This may complicate the reliability of DFM estimates in extracting the signal of underlying price pressures.[9]

These observations highlight the challenges of estimating common inflation in real time during extraordinary periods. Notwithstanding this, common inflation remains a useful tool, especially with an adequate sample size. Over the past two years, revisions of common inflation have been relatively minor given the increasing sample size and stable economic conditions. Consequently, only minor revisions to common inflation are expected unless future economic shocks occur. It is crucial to complement real-time estimates with other analytical tools to maintain policy relevance across various economic contexts.

[9] Similar observations were noted in Sullivan (2022), indicating that unusually large revisions to CPI-common in Canada in 2022 were predominantly driven by increased common price movements among CPI components amid widespread inflationary pressures.

Chart 7: Real-time estimates of the common inflation



Source: Department of Statistics, Malaysia and authors' estimates.

5.3.1 Sample size and real-time estimate revisions

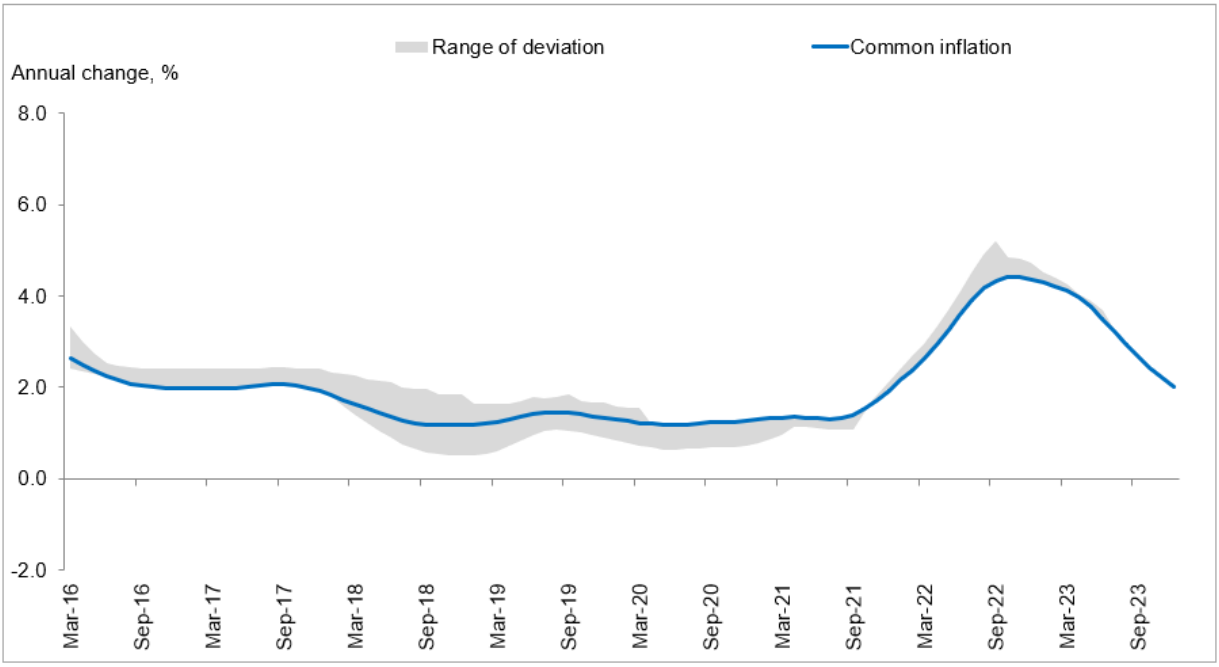
To investigate the impact of sample size on real-time estimate revisions, we compared four-digit level CPI data (discontinued in December 2023) with a larger sample size to the newly published five-digit level CPI data with a shorter sample size (Chart 7).

The common component derived from four-digit level CPI data was based on a sample starting from 1991 and scaled against headline inflation from 2011 onwards. Real-time estimates were obtained using the same iterative process as previously described, starting with a 25-year training sample from 1991 to 2016, which is recursively extended to December 2023.

On average, historical revisions to the four-digit level common inflation were around 0.3 percentage points in absolute terms, smaller than the 0.5 percentage points observed for five-digit level CPI data. Additionally, during the COVID-19 pandemic, smaller deviations in real-time estimate revisions were noted for four-digit level CPI data (Chart 8) compared to five-digit level CPI data (Chart 7).

Thus, the sample size is crucial for real-time estimate revisions, along with broader economic conditions. Using sufficiently large sample sizes ensures the stability of DFM estimates when deriving unobserved latent variables.

Chart 8: Real-time estimates of the common inflation using four-digit level CPI data



Source: Department of Statistics, Malaysia and authors' estimates.

6. Conclusion

This paper estimates common inflation for Malaysia, defined as broad price movements influenced by general macroeconomic conditions while excluding sector-specific disturbances, using a DFM with monthly disaggregated CPI series at the five-digit level. Common inflation serves as a gauge of underlying inflationary pressures that is less susceptible to idiosyncratic shocks, more persistent, and can signal the future trajectory of headline inflation.

Our analysis suggests that the rise in headline inflation following the recovery from the COVID-19 pandemic differs significantly from previous inflationary episodes. This surge was primarily driven by a combination of supply and demand shocks, as manifested by the increase in common inflation. To rein in broad-based inflationary pressures stemming from economy-wide factors that could risk medium-term price stability, pre-emptive monetary policy adjustments were necessary. Prior inflationary spikes were mainly caused by short-lived idiosyncratic shocks, which typically did not require a monetary policy response. In contrast, broad-based inflationary pressures from demand shocks warrant pre-emptive monetary tightening. This distinction emphasises the importance of recognising the difference between transient and persistent inflationary pressures, highlighting the necessity for timely policy interventions in the event of demand-driven inflationary shocks.

Notwithstanding this, it is essential to maintain vigilance against future sector-specific shocks. Given the interconnectedness of supply chains and product markets, idiosyncratic price

shocks could escalate into sustained general price pressures if they intensify or lead to widespread behavioural changes, including shifts in inflation expectations. As monetary policy seeks to manage the widespread inflationary pressures and maintain well-anchored inflation expectations, it may need to pre-emptively address potential inflation risks, particularly those posed by idiosyncratic shocks that carry an elevated risk of propagating into general price increases.

Furthermore, the reliability of real-time estimates of common inflation may become a concern when the sample size is small and during periods of significant economic shocks. Future research should prioritise refining methodologies to enhance the robustness of these estimates. In light of these challenges, the common inflation indicator developed in this paper should be employed in conjunction with other existing surveillance tools to ensure a reliable and comprehensive analysis of inflation dynamics for monetary policy considerations.

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